Complete Summary

GUIDELINE TITLE

Urinary stone disease. In: Guidelines on paediatric urology.

BIBLIOGRAPHIC SOURCE(S)

Urinary stone disease. In: Tekgul S, Riedmiller H, Gerharz E, Hoebeke P, Kocvara R, Nijman R, Radmayr C, Stein R. Guidelines on paediatric urology. Arnhem, The Netherlands: European Association of Urology, European Society for Paediatric Urology; 2008 Mar. p. 52-63. [70 references]

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Urinary stone disease

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Pediatrics
Surgery
Urology

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

- To outline a practical and preliminary approach to paediatric urological problems
- To increase the quality of care for children with urological problems

TARGET POPULATION

Children and adolescents with urinary stone disease

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis

1. Recognition of clinical presentation: signs and symptoms
2. Imaging: renal ultrasonography, abdominal flat plate examination, spiral computed tomography (CT), noncontrast helical CT scan, intravenous pyelography
3. Metabolic evaluation
4. Stone analysis

Treatment/Management

1. Stone elimination
    - Spontaneous passage
    - Extracorporeal shock-wave lithotripsy with or without stenting
    - Percutaneous nephrolithotomy
    - Retrograde intrarenal surgery
    - Ureterorenoscopy
    - Open stone surgery
2. Medical treatment based on stone analysis
    - Dietary interventions
    - Increased fluid intake
    - Antibiotics
    - Pharmacotherapy: hydrochlorothiazide, pyridoxine, potassium citrate or other citrate preparations, alpha-mercaptopropionyl glycine, D-penicillamine

MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of imaging tests
- Clearance rate of stones
- Post-treatment stone-free rate

- Urinary tract infection
- Treatment complication rates
- Post-treatment hospitalization rates and hospital length of stay

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guidelines were based on current literature following a systematic review using MEDLINE.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

1a Evidence obtained from meta-analysis of randomized trials

1b Evidence obtained from at least one randomized trial

2a Evidence obtained from at least one well-designed controlled study without randomization

2b Evidence obtained from at least one other type of well-designed quasi-experimental study

3 Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies and case reports

4 Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Application of a structured analysis of the literature was not possible due to a lack of well-designed studies. Whenever possible, statements have been classified in terms of level of evidence and grade of recommendation. Due to the limited availability of large randomized controlled trials – influenced also by the fact that a considerable number of treatment options relate to surgical interventions on a large spectrum of different congenital problems – this document is therefore largely a consensus document.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

- The first step in the European Association of Urology (EAU) guidelines procedure is to define the main topic.
- The second step is to establish a working group. The working groups comprise about 4-8 members, from several countries. Most of the working group members are academic urologists with a special interest in the topic. In general, general practitioners or patient representatives are not part of the working groups. A chairman leads each group. A collaborative working group consisting of members representing the European Society for Paediatric Urology (ESPU) and the EAU has gathered in an effort to produce the current update of the paediatric urology guidelines.
- The third step is to collect and evaluate the underlying evidence from the published literature.
- The fourth step is to structure and present the information. The strength of the recommendation is clearly marked in three grades (A-C), depending on the evidence source upon which the recommendation is based. Every possible effort is made to make the linkage between the level of evidence and grade of recommendation as transparent as possible.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grades of Recommendation

A. Based on clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomized trial
B. Based on well-conducted clinical studies, but without randomized clinical studies
C. Made despite the absence of directly applicable clinical studies of good quality

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

There is no formal external review prior to publication.

The Appraisal of Guidelines for Research and Evaluation (AGREE) instrument was used to analyse and assess a range of specific attributes contributing to the validity of a specific clinical guideline.

The AGREE instrument, to be used by two to four appraisers, was developed by the AGREE collaboration (www.agreecollaboration.org) using referenced sources for the evaluation of specific guidelines. (See the "Availability of Companion Documents" field for further methodology information).

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Levels of evidence (**1a-4**) and grades of recommendation (**A-C**) are defined at the end of the "Major Recommendations" field.

Stone Formation Mechanisms, Diagnosis of Causative Factors and Medical Treatment for Specific Stone Types

Urinary stone formation is the result of a complex process involving metabolic, anatomical factors and presence of infection.

When supersaturated in urine calcium, oxalate, uric acid and cystine molecules may cause stone formation. A decreased concentration of crystallization inhibitors (citrate, magnesium, pyrophosphate, macromolecules and glycosaminoglycans) may sometimes be the sole factor playing a role in the formation of urinary stones. Urinary pH changes also affect stone formation.

An impaired flow of urine due to abnormal morphology may facilitate stasis and increase the concentration of stone-forming substances.

Calcium Stones

Hypercalciuria. This is defined by a 24-hour urinary calcium excretion of more than 4 mg/kg/day in a child weighing less than 60 kg. In infants younger than 3 months, 5 mg/kg/day is considered to be the upper limit of normal for calcium excretion.

A good screening test for hypercalciuria compares the ratio of urinary calcium to creatinine. The normal calcium-to-creatinine ratio in children is less than 0.2. If the calculated ratio is higher than 0.2, repeat testing is indicated. Neonates and infants have a higher calcium excretion and lower creatinine excretion than older children. If the follow-up ratios are normal, then no additional testing for hypercalciuria is needed. However, if the ratio remains elevated, a timed 24-hour urine collection should be obtained and the calcium excretion calculated.

The 24-hour calcium excretion test is the criterion standard for the diagnosis of hypercalciuria. If calcium excretion is higher than 4 mg/kg/day (0.1 mmol/kg/day), the diagnosis of hypercalciuria is confirmed and further evaluation is warranted. Further evaluation includes levels of serum bicarbonate, creatinine, alkaline phosphatase, calcium, magnesium, pH, and parathyroid hormone. Freshly voided urine should be measured for pH.

A 24-hour urine collection should also be collected for measurement of calcium, phosphorus, sodium, magnesium, citrate and oxalate. Meanwhile dietary manipulations should be tried to normalize urine calcium.

Initial management is always to increase fluid intake and urinary flow. Dietary modification is a mandatory part of effective therapy. The child should be referred to a dietician to assess accurately the daily intake of calcium, animal protein, and sodium. Dietary sodium restriction is recommended as well as maintenance of calcium intake consistent with the daily needs of the child.

A brief trial of a low-calcium diet can be carried out to determine if exogenous calcium intake is contributing to a high urinary calcium. However, great caution should be used when trying to restrict calcium intake for long periods (**Level of evidence: 3; Grade of recommendation: B**).

Hydrochlorothiazide and other thiazide-type diuretics may be used to treat hypercalciuria at a dosage of 1-2 mg/kg/day (**Level of evidence: 3; Grade of recommendation: C**). Citrate therapy is also useful if citrate levels are low or if hypercalciuria persists, despite other therapies (**Level of evidence: 4; Grade of recommendation: C**).

Hyperoxaluria. Oxalic acid is a metabolite excreted by the kidneys. Only 10%-15% of oxalate comes from diet. Normal school children excrete less than 50 mg (0.57 mmol)/1.73m^2/day, while infants excrete four times as much.

The diagnosis of primary hyperoxaluria is made upon laboratory findings of severe hyperoxaluria and clinical symptoms. The definitive diagnosis requires liver biopsy to assay the enzyme activity.

The majority of children who have high levels of oxalate excretion in urine may not have any documented metabolic problem or any dietary cause. This is known as idiopathic 'mild' hyperoxaluria, with urine oxalate levels elevated only mildly in these cases.

The treatment of hyperoxaluria consists of the promotion of high urine flow, restriction of dietary oxalate and regular calcium intake. Pyridoxine may be useful in reducing urine levels, especially in primary hyperoxaluria (**Level of evidence: 4; Grade of recommendation: C**).

Hypocitraturia. Low urine citrate may be a significant cause of calcium stone disease. In adults, hypocitraturia is the excretion of citrate in urine of less than 320 mg/day (1.5 mmol/day) for adults; this value must be adjusted for children depending on body size.

Due to the increased stone risk in hypocitraturia, the restoration of normal citrate levels is advocated to reduce stone formation. Although some studies have shown that citrate replacement therapy reduces the risk of stone formation in an adult population, there are few relevant studies in children. Hypocitraturia is treated by potassium citrate at a starting dose of 1 mEq/kg, given in two divided doses (**Level of evidence: 3; Grade of recommendation: B**).

Uric Acid Stones

Uric acid stones are responsible for urinary calculi in 4-8% of children. Uric acid is the end product of purine metabolism. Hyperuricosuria is the main cause of uric acid stone formation in children. A daily output of uric acid of more than 10 mg/kg/day is considered to be hyperuricosuria.

Uric acid stones are non-opaque stones. Plain X-rays are insufficient to show uric acid stones, and renal sonography and spiral computed tomography (CT) are used for diagnosis.

Alkalinization of urine is the mainstay of therapy and prevention for uric acid stones. Citrate preparations are useful as alkalinizing agents. Maintaining a urine pH of 6 to 6.5 is sufficient to prevent uric acid stones.

Cystine Stones

Cystinuria is the cause of cystine stone formation and accounts for 2-6% of all urinary stones in children.

Cystine solubility is pH-dependent, with cystine precipitation beginning at pH levels <7.0. Other metabolic conditions, such as hypercalciuria, hypocitraturia and hyperuricosuria, may accompany cystinuria, so leading to the formation of mixed-composition stones.

Cystine stones are faintly radiolucent and may be difficult to show on regular radiograph studies. They are also hard in texture and more difficult to disintegrate by extracorporeal shock-wave lithotripsy (ESWL).

The medical treatment for cystine stones aims to reduce cystine saturation in urine and increase its solubility. The initial treatment consists of maintaining a high urine flow and the use of alkalinizing agents, such as potassium citrate to maintain urine pH at above 7.0. If this treatment fails, the use of alpha-mercaptopropionyl glycine or D-penicillamine may reduce cystine levels in urine and prevent stone formation. Use of these drugs can be associated with severe side effects, such as bone marrow depression and nephrotic syndrome (**Level of evidence: 4; Grade of recommendation: C**).

Infection Stones (Struvite Stones)

Infection-related stones constitute nearly 5% of urinary stones in children.

In addition to bacterial elimination, stone elimination is essential for treatment, as stones will harbour infection and antibiotic treatment will not be effective.

Consideration should be given to investigating any congenital problem that causes stasis and infection. Genitourinary tract anomalies predispose to formation of such stones.

Clinical Presentation

Presentation tends to be age-dependent, with symptoms such as flank pain and haematuria being more common in older children. Non-specific symptoms (e.g., irritability, vomiting) are common in very young children. Haematuria, usually gross, occurring with or without pain, is less common in children. However, microscopic haematuria may be the sole indicator and is more common in children. In some cases, urinary infection may be the only finding leading to radiological imaging in which a stone is identified.

Diagnosis

Imaging

Generally, ultrasonography should be used as a first study. Renal ultrasonography is very effective for identifying stones in the kidney. Many radiolucent stones can be identified with a simple abdominal flat-plate examination.

If no stone is found but symptoms persist, spiral CT scanning is indicated. The most sensitive test for identifying stones in the urinary system is non-contrast helical CT scanning. It is safe and rapid, with 97% sensitivity and 96% specificity (**Level of evidence: 2; Grade of recommendation: B**). Intravenous pyelography is rarely used in children, but may be needed to delineate the caliceal anatomy prior to percutaneous or open surgery.

Metabolic Evaluation

Due to the high incidence of predisposing factors for urolithiasis in children and high stone recurrence rates, every child with urinary stone should be given a complete metabolic evaluation.

Metabolic evaluation includes:

- Family and patient history of metabolic problems.
- Analysis of stone composition (following stone analysis, metabolic evaluation can be modified according to the specific stone type).
- Electrolytes, blood urea nitrogen (BUN), creatinine, calcium, phosphorus, alkaline phosphatase, uric acid, total protein, carbonate, albumin, and parathyroid hormone (if there is hypercalcaemia).
- Spot urinalysis and culture, including ratio of calcium to creatinine.
- Urine tests, including a 24-hour urine collection for calcium, phosphorus, magnesium, oxalate, uric acid citrate, cystine, protein, and creatinine clearance.

Figure 3 in the original guideline document provides an algorithm of how to perform metabolic investigations in urinary stone disease in children and to plan medical treatment accordingly.

Management

With the advance of technology stone management has changed from open surgical approach to endoscopic techniques that are less invasive. Deciding the form of treatment depends on the number, size, location, composition and anatomy of the urinary tract.

Currently, most paediatric stones can easily be managed by extracorporeal shock-wave lithotripsy (ESWL). Endoscopic treatment can be applied easily for ureteric and bladder stones. Percutaneous removal of stones is also possible for kidney stones in children. Only a small portion of children will need an open surgical approach.

Extracorporeal Shock-Wave Lithotripsy (ESWL)

Many reports confirm that shock-wave lithotripsy (SWL) can be performed in children with no suspicion of long-term morbidity of the kidney.

The mean number of shock waves for each treatment is about 1800 and 2000 (up to 4000 if needed) and the mean power set varies between 14kV and 21kV. The use of ultrasonography and digital fluoroscopy has significantly decreased the radiation exposure, and it has been shown that children are exposed to significantly lower doses of radiation compared to adults. Concerns about anaesthesia do not seem to be a problem anymore because of advances in technique and medication, even in the infant period. The type of anaesthesia should be general or dissociative for children under 10 years of age, whereas conventional intravenous sedation or patient-controlled analgesia is an option for older children who are able to co-operate (**Level of evidence: 2b**).

Stone-free rates are significantly affected by various factors. Regardless of the location, as the stone size increases, the stone-free rates decrease and re-treatment rate increases. The stone-free rates for <1 cm, 1-2 cm, >2 cm and overall were reported as nearly 90%, 80%, 60% and 80%, respectively. As the stone size increases, the need for additional sessions increases.

Localization of the calculi has been described as a significant factor affecting the success rates in different studies. Stones in renal pelvis and upper ureter seem to respond better to SWL. In these mentioned sites, the stone clearance rates are nearly 90%. However, SWL was found to be less effective for caliceal stones particularly the lower caliceal stones. Several studies reported stone-free rates for isolated lower caliceal stones varying between 50% and 62%.

ESWL treatment can also be used to treat ureteral calculi. However, this is a more specific issue and with controversies. The success rates with ESWL are less for distal ureteric stones. There may also be technical problems with localization and focusing of ureteric stones in children.

The type of machine used has a strong effect on success rates and complications. First-generation machines can deliver more energy to a larger focal zone, resulting in higher fragmentation rates in a single therapy. However, general anaesthesia is usually required due to the intolerable discomfort associated with a

first-generation machine. Later-generation machines have a smaller focal zone and deliver less energy, and have a lower risk of pulmonary trauma. However, additional treatments may be needed with later-generation machines. The success rate is higher in younger children.

Although stenting does not affect stone clearance, overall complication rates are higher and hospital stay is longer in the unstented patient. Stenting is essential in solitary kidneys undergoing ESWL treatment. Children with a large stone burden have a high risk of developing Steinstrasse and urinary obstruction and should be followed more closely for the risk of prolonged urinary tract obstruction after ESWL. Post-ESWL stent or nephrostomy tube placement may be needed in prolonged obstruction.

ESWL in children may have complications, but these are often self-limiting and transient. The most frequently observed complications are:

- Renal colic
- Transient hydronephrosis
- Dermal ecchymosis
- Urinary tract infection
- Formation of Steinstrasse
- Sepsis
- Haemoptysis, rarely

In children with sterile pre-operative urine cultures, antibiotic prophylaxis to decrease the infectious complications is not recommended. However, every effort should be made to sterilize the urine before performing ESWL, ureteroscopy (URS), or percutaneous nephrolithotomy.

Percutaneous Nephrolithotomy (PCNL)

ESWL is the first choice for treating most renal paediatric stones. However, percutaneous renal surgery can be used for larger and complex stones. Pre-operative evaluation, indication and surgical technique are similar in children compared to adults. PCNL is used as monotherapy in most cases, but is also used as an adjunctive procedure to other therapies.

The use of adult-sized instruments, in association with an increased number of tracts and sheath size, seems to increase the blood loss. However, small-calibre instruments have now been developed and there are some advantages for PCNL in children (particularly smaller children), such as smaller skin incision, single-step dilation and sheath placement, good working access for paediatric instruments, variable length, and lower cost. Now that appropriate-size instruments are available, age is no longer a limiting factor for PCNL.

As monotherapy, PCNL is considerably effective and safe. The reported stone-free rates in the recent literature are between 86.9% and 98.5% after a single session. These rates increase with adjunctive measures, such as second-look PCNL, ESWL and URS. Even in complete staghorn cases, a clearance rate of 89% has been achieved following a single session.

The most frequently reported complications of PCNL in children are bleeding, post-operative fever or infection, and persistent urinary leakage. Bleeding requiring transfusion is reported in 0.4% to 23.9% and is closely associated with stone burden, operative time, sheath size and number of tracts. Post-operative fever and infection has been reported up to 29.3% and 5.5%, respectively; the origin of fever is not thought to be the infection.

The mean post-operative hospital stay is similar to adults. It is reported as 3 to 4 days in all the previously mentioned studies and is much shorter than open surgery. The less invasive nature of this technique has made it a promising alternative to open surgery for treating renal stones in children (**Level of evidence: 2; Grade of recommendation: B**).

Ureterorenoscopy

The increasing availability of smaller size endourological equipment has made it possible to manage paediatric ureteral stones using endoscopic techniques.

The technique used in children is similar to the one used in adults. It is strongly recommended that guide wires are used and the procedure is performed using direct vision. Routine balloon dilation of ureterovesical junction and ureteral stenting are controversial. In general, ureteric dilatation is being done less and less and only in selected cases. The general tendency is to use hydrodilation more as it is shown to be as effective (**Level of evidence: 3; Grade of recommendation: B**).

Different lithotripsy techniques, including ultrasonic, pneumatic and laser lithotripsy, have all been shown to be safe and effective. Because of the smaller size of the probes, laser energy is easier to use in smaller instruments and is more useful for paediatric cases.

All studies reporting the use of endoscopy for ureteric stones in children have clearly demonstrated that there is no significant risk of ureteric strictures or reflux with this mode of therapy (**Level of evidence: 1; grade of recommendation: A**).

Open Stone Surgery

Most stones in children can be managed by ESWL and endoscopic techniques. Yet in some situations, open surgery is inevitable. Good candidates for open stone surgery include very young children with large stones and/or a congenitally obstructed system which also requires surgical correction. Severe orthopaedic deformities may limit positioning for endoscopic procedures. Open surgery would also be a necessity for such children.

Bladder stones in children can usually be managed by endoscopic techniques. Open surgery may also be used for very large bladder stones or for bladder stones caused by an anatomical problem.

Recommendations for interventional management are given in the Table below.

Table. Recommendations for Interventional Management in Paediatric Stones

Stone Size and Location*	Primary Treatment Option	Level of Evidence (LE)	Secondary Treatment Option	
Staghorn stones	Percutaneous Nephrolithotomy (PCNL)	**2b**	Open/SWL	Multiple sessions and accesses with PCNL may stones be needed Combination with SWL may be useful
Pelvis <10 mm	Shock-wave lithotripsy (SWL)	**1a**	Retrograde Intrarenal Surgery (RIRS)/PCNL	
Pelvis 10-20 mm	SWL	**2b**	PCNL/Open	Multiple sessions with SWL may be needed PCNL has similar recommendation grade
Pelvis >20 mm	PCNL	**2b**	SWL/Open	Multiple sessions with SWL may be needed
Lower pole calix <10 mm	SWL	**2c**	RIRS/PCNL	Anatomical variations are important for complete clearance after SWL
Lower pole calix >10 mm	PCNL	**2b**	SWL	Anatomical variations are important for complete clearance after SWL
Upper ureteric stones	SWL	**2b**	PCNL/URS/Open	
Lower ureteric stones	Ureteroscopy (URS)	**1a**	SWL/Open	Additional intervention need is high with SWL
Bladder stones	Endoscopic	**2b**	Open	Open is easier and with less operative time with large stones

* Cystine and uric acid stones excluded.

Definitions:

Levels of Evidence

1a Evidence obtained from meta-analysis of randomized trials

1b Evidence obtained from at least one randomized trial

2a Evidence obtained from at least one well-designed controlled study without randomization

2b Evidence obtained from at least one other type of well-designed quasi-experimental study

3 Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies and case reports

4 Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities

Grades of Recommendation

A. Based on clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomized trial
B. Based on well-conducted clinical studies, but without randomized clinical studies
C. Made despite the absence of directly applicable clinical studies of good quality

CLINICAL ALGORITHM(S)

The original guideline document contains a clinical algorithm providing information on performing metabolic investigations and planning medical treatment in the pediatric patient with urinary stone disease.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for some of the recommendations (see "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate diagnosis, treatment, and management of pediatric urinary stones

POTENTIAL HARMS

- Use of alpha-mercaptopropionyl glycine or D-penicillamine to reduce cystine levels in urine and prevent stone formation can be associated with severe side effects, such as bone marrow depression and nephrotic syndrome.
- Extracorporeal shock-wave lithotripsy (ESWL) in children may have complications, but these are often self-limiting and transient. The most frequently observed complications are renal colic, transient hydronephrosis, dermal ecchymosis, urinary tract infection, formation of Steinstrasse, sepsis, and rarely, hemoptysis.
- General anaesthesia is usually required for ESWL done with a first-generation machine due to the intolerable discomfort associated with these machines. First-generation machines also have a higher risk of causing pulmonary trauma.
- The most frequently reported complications of percutaneous nephrolithotomy in children are bleeding, post-operative fever or infection, and persistent urinary leakage. Bleeding requiring transfusion is reported in 0.4% to 23.9% and is closely associated with stone burden, operative time, sheath size and number of tracts. Post-operative fever and infection has been reported up to 29.3% and 5.5%, respectively; the origin of fever is not thought to be the infection.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The purpose of these texts is not to be proscriptive in the way a clinician should treat a patient but rather to provide access to the best contemporaneous consensus view on the most appropriate management currently available. European Association of Urology (EAU) guidelines are not meant to be legal documents but are produced with the ultimate aim to help urologists with their day-to-day practice.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The European Association of Urology (EAU) Guidelines long version (containing all 19 guidelines) is reprinted annually in one book. Each text is dated. This means that if the latest edition of the book is read, one will know that this is the most updated version available. The same text is also made available on a CD (with hyperlinks to PubMed for most references) and posted on the EAU websites Uroweb and Urosource (www.uroweb.org/professional-resources/guidelines/ & http://www.urosource.com/diseases/).

Condensed pocket versions, containing mainly flow-charts and summaries, are also printed annually. All these publications are distributed free of charge to all (more than 10,000) members of the Association. Abridged versions of the guidelines are published in European Urology as original papers. Furthermore, many important websites list links to the relevant EAU guidelines sections on the

association websites and all, or individual, guidelines have been translated to some 15 languages.

IMPLEMENTATION TOOLS

Clinical Algorithm

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Urinary stone disease. In: Tekgul S, Riedmiller H, Gerharz E, Hoebeke P, Kocvara R, Nijman R, Radmayr C, Stein R. Guidelines on paediatric urology. Arnhem, The Netherlands: European Association of Urology, European Society for Paediatric Urology; 2008 Mar. p. 52-63. [70 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2008 Mar

GUIDELINE DEVELOPER(S)

European Association of Urology - Medical Specialty Society
European Society for Paediatric Urology - Medical Specialty Society

SOURCE(S) OF FUNDING

European Association of Urology

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Authors: S. Tekgül; H. Riedmiller; E. Gerharz; P. Hoebeke; R. Kocvara; R. Nijman; Chr. Radmayr; R. Stein

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

All members of the working group submit a conflict of interest form. The information is kept on file in the European Association of Urology (EAU) Central Office database. This guidelines document was developed with the financial support of the EAU. No external sources of funding and support have been involved. The EAU is a non-profit organisation and funding is limited to administrative assistance, travel, and meeting expenses. No honoraria or other reimbursements have been provided.

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the European Association of Urology Web site.

Print copies: Available from the European Association of Urology, PO Box 30016, NL-6803, AA ARNHEM, The Netherlands.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- EAU guidelines office template. Arnhem, The Netherlands: European Association of Urology (EAU); 2007. 4 p.
- The European Association of Urology (EAU) guidelines methodology: a critical evaluation. Arnhem, The Netherlands: European Association of Urology (EAU); 18 p.

Print copies: Available from the European Association of Urology, PO Box 30016, NL-6803, AA ARNHEM, The Netherlands.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on November 18, 2008. The information was verified by the guideline developer on December 19, 2008.

COPYRIGHT STATEMENT

DISCLAIMER

NGC DISCLAIMER

The National Guideline Clearinghouse™ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at http://www.guideline.gov/about/inclusion.aspx .

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.

Date Modified: 1/19/2009


DEPARTMENT OF HEALTH & HUMAN SERVICES • USA